DETAILED ACTION

This Office Action is in response to applicant's amendment filed 12/19/2011.

Claims 1-4, 6, 8-11, 13, and 15-19 are currently pending in this application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1.   Claims 1-4, 8-11, and 15-19 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Shi (EP 0957220) in view of Shilton (WO 99/41834).

Claim 1, Shi teaches:

An authentication apparatus comprising

a body, and a partner side paired with the body (Shi, Paragraph

[0008], The lock body is a body, and the key-body is a partner side.), the

apparatus comprising:

a random pulse generator, arranged in the body or the partner side,

or in both the body and the partner side (Shi, Fig. 3, The oscillator is a

random pulse generator, and is located within the random number generator IC3,

which is part of the body side.), **which generates random pulses** (Shi,

Paragraph [0016], The oscillator produces oscillations at a random frequency, i.e. random pulses.);

a means which outputs authentication data (Shi, Paragraph [0012], Random code generator IC3 is a means which outputs authentication data based on the circuit in Fig. 3.**) based on both a random pulse voltage** (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random.**) and a random pulse interval of the random pulses generated by the random pulse generator** (Shi, Paragraphs [0016-0017], The output of oscillator A, which is the random pulse generator, is used to generate the input of the VCO. Therefore, both the random pulse interval of the random pulses generated by the random pulse generator and the random pulse voltages are used to generate the true random number, which is later used to generate authentication data.);

a means which stores authentication data (Shi, Paragraph [0006]),

a communication means which transmits/receives authentication data (Shi, Paragraph [0008]); and

a control means which controls the communication of authentication data and collates authentication data (Shi, Paragraph [0009], Microprocessor

IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.**),**

wherein the random pulse interval of the random pulses is measured using clock pulses (Shi, Paragraph [0016], The oscillator outputs at a random frequency and is sampled by an independent clock pulse. Since the oscillator has a random frequency, i.e. a pulse interval, the pulse interval is measured using clock pulses.**), and**

wherein said authentication data is outputted based on a combination of the random pulse voltage of the random pulses (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.**) and a number of the clock pulses acquired by measuring the random pulse interval of the random pulses** (Shi, Paragraphs [0016-0017], The sampling of the random oscillator over independent clock pulse series is a number of clock pulses acquired. This sampling is received by the m-sequence generator, followed by the D/A converter, and is used by the VCO to eventually output a random number.**).**

Shi does not teach:

The random pulse generator detects α particles, a beta ray or a gamma ray released by the collapse of an atomic nucleus and generates the random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or the gamma ray released by the collapse of the atomic nucleus (Shilton, Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page 5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2). The radioactive decay is the collapse of the atomic nucleus.**) and generates random pulses** (Shilton, Page 4, Lines 13-15**).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the random code generator in Shi by integrating the low radiation source and detector for generating random events as taught by Shilton.

The motivation would be to produce random codes that are difficult to duplicate to prevent fraud or corruption of random pulse generators (see Shilton, Page 1, Lines 9-18).

Shi in view of Shilton does not explicitly teach:

An interval of the clock pulses is shorter than the interval of the random pulses.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention for the clock pulse series interval to be shorter than the interval of the random pulses.

The motivation would be to ensure that the sampled output of the random pulses be sampled at a different frequency at which the output of random pulses are generated, thus ensuring truly random numbers (see Shi, Paragraph [0016]).

Claim 2, Shi in view of Shilton further teaches:

The control means receives authentication data stored in the storage means arranged on the partner side, collates the received authentication data with authentication data of the storage means arranged in the body (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.), **and in accordance with the result of collation, authenticates the partner side** (Shi, Paragraph [0009]), **and in that upon completion of the authentication, authentication data is updated, and new authentication data thus updated is written in the storage means of the body and the partner side** (Shi, Paragraph [0009]).

Claim 3, Shi in view of Shilton further teaches:

A drive unit control means which controls a drive unit in accordance with the result of collation by the control means (Shi, Paragraph [0009], The driving mechanism, represented by an output drive IC5, is a drive unit control means, which controls the lock of a lock-body, which is a drive unit.).

Claim 4, Shi in view of Shilton further teaches:

The body is the body of an electronic lock, and the partner side is a

key (Shi, Paragraph [0008], The lock-body comprises a microprocessor,

memory, random code generator, driver, and alarm unit, thus it is an electronic

lock.).

Claim 8, Shi in view of Shilton further teaches:

The communication means transmits/receives the authentication

data by circuit connection due to contact or by infrared light

communication or radio communication (Shi, Paragraph [0008]).

Claim 9, Shi teaches:

An authentication method comprising the steps of:

generating random pulses by a random pulse generator (Shi,

Paragraph [0016], The oscillator produces oscillations at a random frequency, i.e.

random pulses.) **arranged in a body or a partner side paired with the body,**

or in both the body and the partner side (Shi, Fig. 3, The oscillator is a

random pulse generator, and is located within the random number generator IC3,

which is part of the body side.)**;**

outputting authentication data (Shi, Paragraph [0012], Random code

generator IC3 is a means which outputs authentication data based on the circuit

in Fig. 3.) **based on both of a random pulse voltage** (Shi, Paragraph [0017], A

true random code is partially created from a voltage-controlled oscillator to obtain

a spectrum-spreaded signal. The inputs used to generate the output at the VCO

are converted into levels based on a pseudo-random rule, hence is a random

pulse voltage. Although the generation of the output of the D/A converter is

based on a pseudo-random rule, the output of the D/A converter itself is random.**)**

and a random pulse interval of the random pulses generated by the random

pulse generator (Shi, Paragraphs [0016-0017], The output of oscillator A, which

is the random pulse generator, is used to generate the input of the VCO.

Therefore, both the random pulse interval of the random pulses generated by the

random pulse generator and the random pulse voltages are used to generate the

true random number, which is later used to generate authentication data.**)**;

 storing authentication data (Shi, Paragraph [0006])**;**

 transmitting/receiving authentication data (Shi, Paragraph [0008])**; and**

 controlling the communication of authentication data and collating

authentication data (Shi, Paragraph [0009], Microprocessor IC1 is the control

means, and the comparison between the codes stored in the lock-body and the

key-body is the collation of the authentication data.**),**

 wherein the pulse interval of the random pulses is measured using

clock pulses (Shi, Paragraph [0016], The oscillator outputs at a random

frequency and is sampled by an independent clock pulse. Since the oscillator

has a random frequency, i.e. a pulse interval, the pulse interval is measured

using clock pulses.**), and**

 wherein said authentication data is outputted based on a

combination of the random pulse voltage of the random pulses (Shi,

Paragraph [0017], A true random code is partially created from a voltage-

controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.**) and a number of the clock pulses acquired by measuring the pulse interval of the random pulses** (Shi, Paragraphs [0016-0017], The sampling of the random oscillator over independent clock pulse series is a number of clock pulses acquired. This sampling is received by the m-sequence generator, followed by the D/A converter, and is used by the VCO to eventually output a random number.**).**

Shi does not teach:

The random pulse generator detects the α particles, the beta ray or a gamma ray released by the collapse of an atomic nucleus and generates random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or the gamma ray released by the collapse of the atomic nucleus (Shilton, Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page 5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2).**) and generates random pulses** (Shilton, Page 4, Lines 13-15**).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the random code generator in Shi by integrating the low radiation source and detector for generating random events as taught by Shilton.

The motivation would be to produce random codes that are difficult to duplicate to prevent fraud or corruption of random pulse generators (see Shilton, Page 1, Lines 9-18).

Shi in view of Shilton does not explicitly teach:

An interval of the clock pulses is shorter than the interval of the random pulses.

However, it would have been obvious to one of ordinary skill in the art at the time of the invention for the clock pulse series interval to be shorter than the interval of the random pulses.

The motivation would be to ensure that the sampled output of the random pulses be sampled at a different frequency at which the output of random pulses are generated, thus ensuring truly random numbers (see Shi, Paragraph [0016]).

Claim 10, Shi in view of Shilton further teaches:

The control step receives the authentication data stored in a storage means arranged on the partner side, collates the received authentication data with authentication data of a storage means arranged in the body (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of

the authentication data.), **authenticates the partner side in accordance with the result of collation** (Shi, Paragraph [0009]), **and after completion of authentication, updates authentication data, and writes new authentication data thus updated in the storage means of the body and the partner side** (Shi, Paragraph [0009]).

Claim 11, Shi in view of Shilton further teaches:

A drive unit control step for controlling a drive unit in accordance with the result of collation in the control step (Shi, Paragraph [0009], The driving mechanism, represented by an output drive IC5, is a drive unit control means, which controls the lock of a lock-body, which is a drive unit.).

Claim 15, Shi in view of Shilton further teaches:

The communication step transmits and receives the authentication data by circuit connection due to contact or by infrared light communication or radio communication (Shi, Paragraph [0008]).

Claim 16, Shi in view of Shilton further teaches:

The body or the partner side includes the hardware of a computer (Shi, Paragraph [0012], The microprocessor IC1 and the non-volatile memory unit IC2 are hardware of a computer, and the body includes the hardware.), **and the partner side or the body including the random pulse generator is mounted integrally with or independently of the hardware of the computer**

(Shi, Paragraph [0012], As further disclosed in Fig. 1, the true random generator

IC3 is mounted integrally with the hardware of the computer components IC1 and

IC2 within the lock-body.).

Claim 17, Shi in view of Shilton further teaches:

The body or the partner side includes the hardware of a computer

(Shi, Paragraph [0012], The microprocessor IC1 and the non-volatile memory

unit IC2 are hardware of a computer, and the body includes the hardware.), **and**

the partner side or the body including the random pulse generator is

mounted integrally with or independently of the hardware of the computer

(Shi, Paragraph [0012], As further disclosed in Fig. 1, the true random generator

IC3 is mounted integrally with the hardware of the computer components IC1 and

IC2 within the lock-body.).

Claim 18, Shi teaches:

A non-transitory computer readable memory medium storing an

authentication program, said authentication program (Shi, Paragraph [0006],

Shi discloses in Fig. 2 a flow chart showing the operation of the cryptogram lock

system performed by the microprocessor IC1, non-volatile memory unit of the

lock-body and key-body, random code generator IC3, output driver IC5, and

alarm unit IC6, which is automatically performed. It is inherent of a system that

automatically performs the steps disclosed in Fig. 2 and Paragraph [0020] that

the steps, as a whole, are programmed into the microprocessor IC1 of the lock-

body.) **comprising:**

a code to generate random pulses from a random pulse generator

(Shi, Paragraph [0016], The oscillator produces oscillations at a random

frequency, i.e. random pulses.) **arranged in a body or a partner side paired**

with the body, or in both the body and the partner side partner side (Shi,

Fig. 3, The oscillator is a random pulse generator, and is located within the

random number generator IC3, which is part of the body side.);

a code to output authentication data (Shi, Paragraph [0012], Random

code generator IC3 is a means which outputs authentication data based on the

circuit in Fig. 3.**) based on both of a random pulse voltage** (Shi, Paragraph

[0017], A true random code is partially created from a voltage-controlled oscillator

to obtain a spectrum-spreaded signal. The inputs used to generate the output at

the VCO are converted into levels based on a pseudo-random rule, hence is a

random pulse voltage. Although the generation of the output of the D/A

converter is based on a pseudo-random rule, the output of the D/A converter

itself is random.**) and a random pulse interval of the random pulses**

generated by the random pulse generator (Shi, Paragraphs [0016-0017], The

output of oscillator A, which is the random pulse generator, is used to generate

the input of the VCO. Therefore, both the random pulse interval of the random

pulses generated by the random pulse generator and the random pulse voltages

are used to generate the true random number, which is later used to generate

authentication data.);

a code to store authentication data (Shi, Paragraph [0006]);

a code to transmit/receive authentication data (Shi, Paragraph [0008]); and

a code to control the communication of authentication data and collate authentication data (Shi, Paragraph [0009], Microprocessor IC1 is the control means, and the comparison between the codes stored in the lock-body and the key-body is the collation of the authentication data.),

wherein the pulse interval of the random pulses is measured using clock pulses (Shi, Paragraph [0016], The oscillator outputs at a random frequency and is sampled by an independent clock pulse. Since the oscillator has a random frequency, i.e. a pulse interval, the pulse interval is measured using clock pulses.), and

wherein said authentication data is outputted based on a combination of the random pulse voltage of the random pulses (Shi, Paragraph [0017], A true random code is partially created from a voltage-controlled oscillator to obtain a spectrum-spreaded signal. The inputs used to generate the output at the VCO are converted into levels based on a pseudo-random rule, hence is a random pulse voltage. Although the generation of the output of the D/A converter is based on a pseudo-random rule, the output of the D/A converter itself is random. Since the input to the VCO was originally generated by the random pulse generator, the random pulse voltage is of the random pulses.) and a number of the clock pulses acquired by measuring the pulse interval of the random pulses (Shi, Paragraphs [0016-0017], The

sampling of the random oscillator over independent clock pulse series is a

number of clock pulses acquired. This sampling is received by the m-sequence

generator, followed by the D/A converter, and is used by the VCO to eventually

output a random number.**).**

Shi does not teach:

The random pulse generator detects α particles, a beta ray or a

gamma ray released by the collapse of an atomic nucleus and generates

the random pulses.

Shilton teaches:

The random pulse generator detects the α particles, the beta ray or

the gamma ray released by the collapse of the atomic nucleus (Shilton,

Page 5, Lines 18-20, The radiation is detected by a PIN diode (see Shilton, Page

5, Lines 30-31) or directly onto a silicon chip (see Shilton, Page 6, Lines 1-2).

The radioactive decay is the collapse of the atomic nucleus.**) and generates**

random pulses (Shilton, Page 4, Lines 13-15**).**

Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention to modify the random code generator in Shi by

integrating the low radiation source and detector for generating random events

as taught by Shilton.

The motivation would be to produce random codes that are difficult to

duplicate to prevent fraud or corruption of random pulse generators (see Shilton,

Page 1, Lines 9-18).

Shi in view of Shilton does not explicitly teach:

An interval of the clock pulses is shorter than the interval of the

random pulses.

However, it would have been obvious to one of ordinary skill in the art at

the time of the invention for the clock pulse series interval to be shorter than the

interval of the random pulses.

The motivation would be to ensure that the sampled output of the random

pulses be sampled at a different frequency at which the output of random pulses

are generated, thus ensuring truly random numbers (see Shi, Paragraph [0016]).

Claim 19, Shi in view of Shilton further teaches:

The code to control the communication of authentication data and

collate authentication data includes: a code to receive authentication data

stored in a storage means arranged on the partner side (Shi, Paragraph

[0009], The memory of the IC4 of the key-body is the storage means arranged on

the partner side.)**; a code to collate the received authentication data with**

authentication data of a storage means arranged in the body (Shi,

Paragraph [0009], Microprocessor IC1 is the control means, and the comparison

between the codes stored in the lock-body and the key-body is the collation of

the authentication data.)**; a code to authenticate the partner side in**

accordance with the result of collation (Shi, Paragraph [0009])**; a code to**

update authentication data after completion of the authentication (Shi,

Paragraph [0009])**; and a code to write new authentication data thus updated**

in the storage means of the body and the partner side (Shi, Paragraph

[0009]**).

2.   Claims 6 and 13 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Shi (EP 0957220) in view of Shilton (WO 99/41834), and

further in view of Barker (U.S. 5,076,971).

        Claims 6 and 13, Shi in view of Shilton teach:

        An α particle radiator includes ^{241}Am, ^{210}Pb-^{210}Po, ^{210}Po, and/or ^{244}Cm

(Shilton, Page 5, Lines 21-25)**.**

        Shi in view of Shilton teach:

        A beta ray radiator includes ^{210}Pb.

        Barker teaches:

        A beta ray radiator includes ^{210}Pb (Barker, Col. 9, Lines 9-11**).**

        Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention to modify the radiation source in Shi in view of Shilton

with a ^{210}Pb beta emitter as taught by Barker.

        The motivation would be to provide a stable beta radiation source with a

long half-life (see Barker, Col. 2, Lines 6-16) applicable as a low activity radiation

source in a Random Pulse Generator (see Shilton, Page 5, Lines 18-30).

Response to Arguments

Applicant's arguments filed 12/19/2011 have been fully considered but they are not persuasive.

In response to applicant's argument on Page 12 that the Shi reference does not support the office's position of an oscillator and the random pulse generator, the examiner respectfully disagrees. Claim 1, for example, recites a random pulse generator, which generates random pulses. The oscillator A, for example, which is well-known in the art to generate a repeated wave, i.e. random pulses, is fed into a pseudo-random code generator B. Then, the claims recite a means which outputs authentication data, wherein the authentication data is based on "both a random pulse voltage and a random pulse interval of the random pulses generated by the random pulse generator". Because the means which outputs authentication data is represented by the random code generator IC3, the output of the random code is based on both the pulses generated by the oscillator A as well as the pulse interval of the pulses generated by the oscillator A, among other inputs such as the M-sequence generator B. Because the voltage controlled oscillator (VCO) is driven by the outputs of oscillator A and M-sequence generator B, the pulse interval of the pulses generated by oscillator A factor into the generation of authentication data, thus the authentication data is based on a random pulse interval of the random pulse generator. It is noted that the claims do not define the term "random pulse generator" beyond defining its location and that it generates random pulses. Furthermore, the output of the VCO, which includes a sampled pulse voltage and interval of oscillator A, is

based on the combination of voltage and interval. Although oscillator A is not directly outputting the voltage and interval for outputting the authentication to the VCO, for example, the output is still based on an output of the oscillator A, as the claims recite.

In response to applicant's argument on Page 14 that the Shi reference fails to teach clock pulses, the examiner respectfully disagrees. The examiner believes that there is a difference of interpretation of the claims. Although the applicant's specification defines the pulses being measured by counting the number of clock pulses and the counted number of clock pulses can be used as a random value, the examiner believes that the claims do not reflect this feature of the invention. Claim 1 recites "the random pulse interval of the random pulses is measured using clock pulses". In accordance with the Shi reference, the random pulse interval is an interval of the frequency at which the oscillator oscillates. Claim 1 then recites that the authentication data is based on a combination of "random pulse voltage of the random pulses and a number of the clock pulses acquired by measuring the random pulse interval of the random pulses". The claims do not recite that that the clock pulses are counted, nor do they explicitly define the clock pulses. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of

time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire

THREE MONTHS from the mailing date of this action. In the event a first reply is

filed within TWO MONTHS of the mailing date of this final action and the advisory

action is not mailed until after the end of the THREE-MONTH shortened statutory

period, then the shortened statutory period will expire on the date the advisory

action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from

the examiner should be directed to JAMES YANG whose telephone number is

(571)270-5170. The examiner can normally be reached on M-F 8:30-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, Brian Zimmerman can be reached on 571-272-3059. The

fax phone number for the organization where this application or proceeding is

assigned is 571-273-8300.

Information regarding the status of an application may be obtained from

the Patent Application Information Retrieval (PAIR) system. Status information

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free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-

9199 (IN USA OR CANADA) or 571-272-1000.

/J. Y./
Examiner, Art Unit 2612

/Brian A Zimmerman/
Supervisory Patent Examiner, Art Unit 2612